NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

SURFACE DRAINAGE

Field Ditch
(feet)
CODE 607

DEFINITION

A graded ditch for collecting excess water in a field.

PURPOSE

- Drain surface depressions
- Collect or intercept excess surface water, such as sheet flow, from natural and graded land surfaces or channel flow from furrows and carry it to an outlet
- Collect or intercept excess subsurface water and carry it to an outlet.

CONDITIONS WHERE PRACTICE APPLIES

Applicable sites are flat or nearly flat and:

Have soils that are slowly permeable (low permeability) or that are shallow over barriers, such as rock or clay, which hold or prevent ready percolation of water to a deep stratum.

Have surface depressions or barriers that trap rainfall.

Have insufficient land slope for ready movement of runoff across the surface.

Receive excess runoff or seepage from uplands.

Require the removal of excess irrigation water.

2. Permit free entry of water from adjacent land surfaces without causing excessive erosion.

Require control of the water table.

Have adequate outlets for disposal of drainage water by gravity flow or pumping.

Fields with long slopes that have erosion and/or drainage damage.

CRITERIA

Drainage field ditches shall be planned as integral parts of a drainage and erosion control system for the field served and shall collect and intercept water and carry it to an outlet with continuity and without ponding

Investigations. An adequate investigation shall be made of all sites.

Location. Ditches shall be established, insofar as topography and property boundaries permit, in straight or nearly straight courses. Random alinement may be used to follow depressions and isolated wet areas of irregular or undulating topography. Excessive cuts and the creation of small irregular fields shall be avoided.

On extensive areas of uniform topography, collection or interception ditches shall be installed as required for effective drainage.

Design. The size, depth, side slopes, and cross section area shall:

1. Be adequate to provide the required drainage for the site.

3. Provide effective disposal or reuse of excess irrigation water (if applicable).

4. Conduct flow without causing excessive erosion.

5. Provide stable side slopes based on soil characteristics.

6. Permit crossing by field equipment if feasible.

7. Permit construction and maintenance with available equipment.

Where a system of ditches is installed, spacing shall be within the limits shown in the Missouri Supplement to the Engineering Field Handbook (EFH), Chapter 14.

Crossable field ditches

Use the dimensions obtained from the cross-able field ditch table in the Missouri Supple-ment to the EFM, Chapter 14 or design the ditch to carry the discharge determined by $Q=70M^{0.7}$*. The velocity shall be as speci-fied for non-crossable ditches.

The flattest channel grade shall be 0.05 percent.

Channel grade should not exceed 0.6 percent.

Channel must be deep enough to provide drainage from the crop rows. Ditch bottom shall be at least 0.6 foot below the adjacent field surface. For cross slope ditches, part of the total depth may be obtained by constructing a crossable dike on the down slope side of the channel. The minimum top width for the dike is 3 feet. Side slopes for the dike will be the same as for the channel.

Excessive depths should be avoided to prevent erosion on the ditch sides.

Non-crossable field ditches

Ditch capacity shall be adequate to carry the discharge determined by $Q=45M^{0.83}$*.

This discharge may be found in curves in the Missouri Supplement to the EFH, Chapter 14.

Average channel velocity shall not exceed the maximum velocities shown in Table 14-2 of the EFM.

Manning's formula will be used to determine the average velocity in a ditch section. The value of the roughness coefficient "n" should be 0.04.

Ditch bottom shall be at least 0.6 foot below the adjacent field surface. For "V" ditches, the depth should be measured from a point where the channel is 2 feet wide. Design depth shall be contained within the constructed channel except for minor field depressions. Side slopes should not be steeper than 2 (horizontal):1 (vertical).

*Q= Discharge in cubic feet per second
M= Drainage area in square miles

CONSIDERATIONS

Terraces should be used on fields with slopes of 1 percent or greater.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing drainage field ditches shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

Provisions shall be made for maintaining the ditches and their outlets to permit effective drainage.

When the channel grade is 0.3 percent or less, channel smoothing will be needed after each cross channel tillage operation to improve channel drainage.

NATURAL RESOURCES CONSERVATION SERVICE
MISSOURI CONSTRUCTION SPECIFICATION
FOR
SURFACE DRAINAGE
Field Ditch
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General

The work shall consist of the site preparation, excavation and grading field drainage ditches with or without an associated ridge. Construction shall be in a manner that erosion will be minimized and held within tolerable and legal limits. The completed job shall be as specified on the drawings and present a workmanlike appearance.

Site preparation

Areas to be excavated and areas to be occupied by spoil and berms shall be cleared of trees, brush, and other debris as required for construction and maintenance. Cleared debris shall be disposed of or utilized to create wildlife cover, as called for in the drawings. Care must be taken to protect all trees to be saved.

Excavation and grading

Channels for crossable field ditches shall not have flat reaches that exceed 100 feet in length or reverse grade. All ditches shall be constructed to the grades and minimum dimensions shown on the drawings. However, the channel for non-crossable ditches may be excavated below design grade.

Spoil shall be spread and leveled so that the surface water can flow into the ditch. If the spoil is to be farmed, it shall be spread so that farming operations will not be hindered.

Additional details:_____

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